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Attorney's Docket No. 9134-32CT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Dhuler
Serial No.: 09/891,700
Filed: June 26, 2001
For: MICROELECTROMECHANICAL DEVICE HAVING SINGLE CRYSTALLINE COMPONENTS AND METALLIC COMPONENTS

Group Art Unit: 2834
Examiner: D. Le
Confirmation No. 2751

October 10, 2002

Box Non-Fee Amendment
Commissioner for Patents
Washington, DC 20231

RESPONSE

Sir:

This communication is responsive to the Official Action of August 5, 2002.

REMARKS

Applicant appreciates the thorough examination as illustrated by the Official Action but respectfully submits that the claims are patentable for the reasons discussed below.

Independent Claims 1 and 35 Are Patentable Over the Cited References

Claims 1, 2, 6-10, 35, 36, 40, and 44 are rejected as obvious under 35 U.S.C. § 103 over United States Patent No. 5,796,152 to Carr et al. ("Carr") in view of United States Patent No. 5,335,712 to Petersen et al. ("Petersen"). Claims 11 and 43 are rejected over Carr, Petersen, and further in view of United States Patent No. 5,881,198 to Haake ("Haake"). Applicant submits, however, that independent Claims 1 and 35 are patentable over the cited references.

Applicant respectfully disagrees with the Official Action's assertion of obviousness as the cited references fail to disclose or suggest all of the recitations of the claims, the alleged obviousness of combining the thermal actuator beams of Petersen with the microcantilever of Carr is without support, and because the Official Action fails to provide the clear and particular evidence for combining the references required for a rejection under § 103. To establish a *prima facie* case of obviousness, the prior art reference or references when combined must teach or suggest *all* the

recitations of the claim, and there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. M.P.E.P. § 2143. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. M.P.E.P. § 2143.01, citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990). To support combining references, evidence of a suggestion, teaching, or motivation to combine must be **clear and particular**, and this requirement for clear and particular evidence is not met by broad and conclusory statements about the teachings of references. *In re Dembicza*k, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999). The Court of Appeals for the Federal Circuit has further stated that, to support combining or modifying references, there must be **particular** evidence from the prior art as to the reason the skilled artisan, with no knowledge of the claimed invention, **would have selected these components for combination in the manner claimed**. *In re Kotzab*, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000).

Respectfully, the Official Action fails to meet the requirements for a showing of obviousness under § 103. First, the cited combination of references fails to teach a single crystalline material "microactuator" as recited in Claims 1 and 35. While Petersen does discuss making its flexure and actuating beams from a single crystal silicon, this is not in the context of a "microactuator." If anything, the beam of Petersen is comparable to the "arched beam" described in the present application and recited in dependent Claim 6, not to the microactuator. (See, e.g., Fig. 1, item 24 as compared with Fig. 1, item 20, which includes item 24). The combination with Carr also fails to address this deficiency as nothing in Petersen or Carr suggests what structure of Carr should be fabricated from a single crystal silicon. Thus, the references provide no motivation to arrive at the claimed single crystalline material microactuator in combination with a "metallic structure" as recited in Claims 1 and 35.

More particularly, Carr describes a microcantilever 52 where "continuous film 54 is P-doped amorphous silicon" or where "film 54 comprises a P-doped polysilicon material" coupled to a "monocrystalline silicon substrate 50." (Carr, Col. 4, lines 14-

37). The film 54 operates with the films 56 and 58, which are "silicon nitride" or "low temperature thermal oxides such as silicon dioxide" or "semiconductive films" to provide the microcantilever 52. (Carr, Col. 4, lines 14-37). The microcantilever 70 of the embodiment of FIGS. 5 and 6 also includes a central film 54, which appears to be the same non-monocrystalline structure as in the embodiment of FIG. 4, and dielectric films 56 and 58. (Carr, Col. 4, lines 50-52).

These multi-layer, distinct material structures are used by Carr as "[b]ecause of the differing TCE's between films 54 and 58, a ...rotation occurs." (Carr, Col. 5, lines 24-26). Thus, the different thermal coefficient of expansions (TCEs) of different parts of the cantilever 52 are required in Carr.

Petersen, as contrasted with the actuator of Carr, is directed to a thermally actuated self test mechanism intended to test "operational capability of flexure area equipped sensors." (Petersen, Abstract). Actuator devices and sensor devices are distinctly different applications. In this sensor context, Peterson suggests a single crystal material for its sensor application specifically to provide the same coefficient of expansion. (Petersen, Col. 5, lines 41-54). Thus, there is no motivation or evidence to combine Peterson with Carr as relied on in the Official Action or any suggestion of what structures in Carr would be made from a single crystalline structure. In fact, use of a single crystalline structure is taught away from by Carr given the specific teaching of providing a cantilever made of materials with different coefficient of expansions to provide actuation in Carr. Accordingly, the rejections of independent Claims 1 and 35, and the claims that depend therefrom, should be withdrawn for at least these reasons.

Furthermore, the Official Action, while stating it would have been obvious to combine the references for "the purpose of maintaining the same coefficient of expansion," also fails to explain what components, if any, of the Carr reference would need the same "coefficient of expansion." At most, Petersen refers to its beam 38 and flexure area as benefiting from having the same coefficient of expansion. (Petersen, Col. 5, lines 41-54). However, the desirability of such a common structure is because the beam 38 is intended to test the deflection of the flexure area based on a level of deflection as compared with a controlled heat flow provided to the beam 38. Such a

motivation simply does not apply to Carr, as discussed above. As described in the present application, the selection of a microactuator from a single crystalline material may be provided to facilitate fabrication, not match coefficients between elements of the microactuator structure. Thus, the alleged motivation not only fails to identify what features in Carr should be modified based on Petersen to arrive at the present invention but even fails to provide a motivation to combine the references at all. Thus, even if Carr did not teach away from the combination relied on in the present rejections, the rejections of Claims 1 and 35 should be withdrawn for at least these additional grounds.

Various of the Dependent Claims are Separately Patentable

The dependent claims are patentable at least based on their dependence on Claim 1 or Claim 35 as discussed above. Various of the dependent claims are also separately patentable. For example, Claim 6 particularly recites various structures of the microactuator that Carr does not disclose. In particular, Applicants submit that, contrary to the assertion of the Official Action, Carr does not disclose "'spaced apart supports" and an "arched beam extending between said spaced apart supports" as recited in Claim 6. Carr is particularly directed to a "cantilevered microstructure." Thus, Carr clearly cannot suggest or disclose placing the cantilever 52 between two supports. In addition, Claim 6 recites additional structures which Peterson, again, fails to suggest should have the same coefficient of expansion. Accordingly, Claim 6 should be allowed for at least these additional reasons. Claim 40 is separately patentable for reasons substantially the same as Claim 6.

Claim 44 is also separately patentable based on the recitations found therein. In particular, the movement of the microactuator, as recited in Claim 44, between the actuated and unactuated position, is "substantially within the plane of the microactuator and the at least one metallic structure." This is illustrated, for example, in FIG. 2E where the actuator member 26 moves horizontally, as drawn in the figure, substantially without vertical displacement. In contrast, the thermal actuator beams 38 shown in Petersen have an "axis of expansion ... displaced slightly from the neutral axis of the flexure beam thereby causing deflection of the seismic mass." (Petersen, Col. 5, lines 33-36). Similarly, while the Office Action asserts that Carr

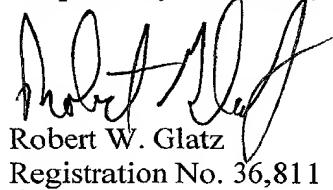
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discloses an acutator moving "between an actuated and unactuated position substantially within the plane (surface of substrate 50)", this is simply not accurate. In contrast to the recital substantially planar movement of Claim 44, as best shown in Figures 7a to 7e of Carr, both vertical and horizontal movement of the microcantilever 52 of Carr occur during movement between actuated and unactuated positions to provide latching. Accordingly, Claim 44 should be allowed for at least these additional reasons.

Conclusion

For the reasons discussed above, Applicant respectfully submits that the present case is in form for allowance. Accordingly, Applicant requests allowance of the pending claims and passing this application to issuance.

Respectfully submitted,



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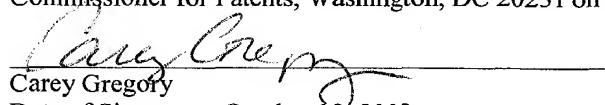


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Carey Gregory

Date of Signature: October 10, 2002
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